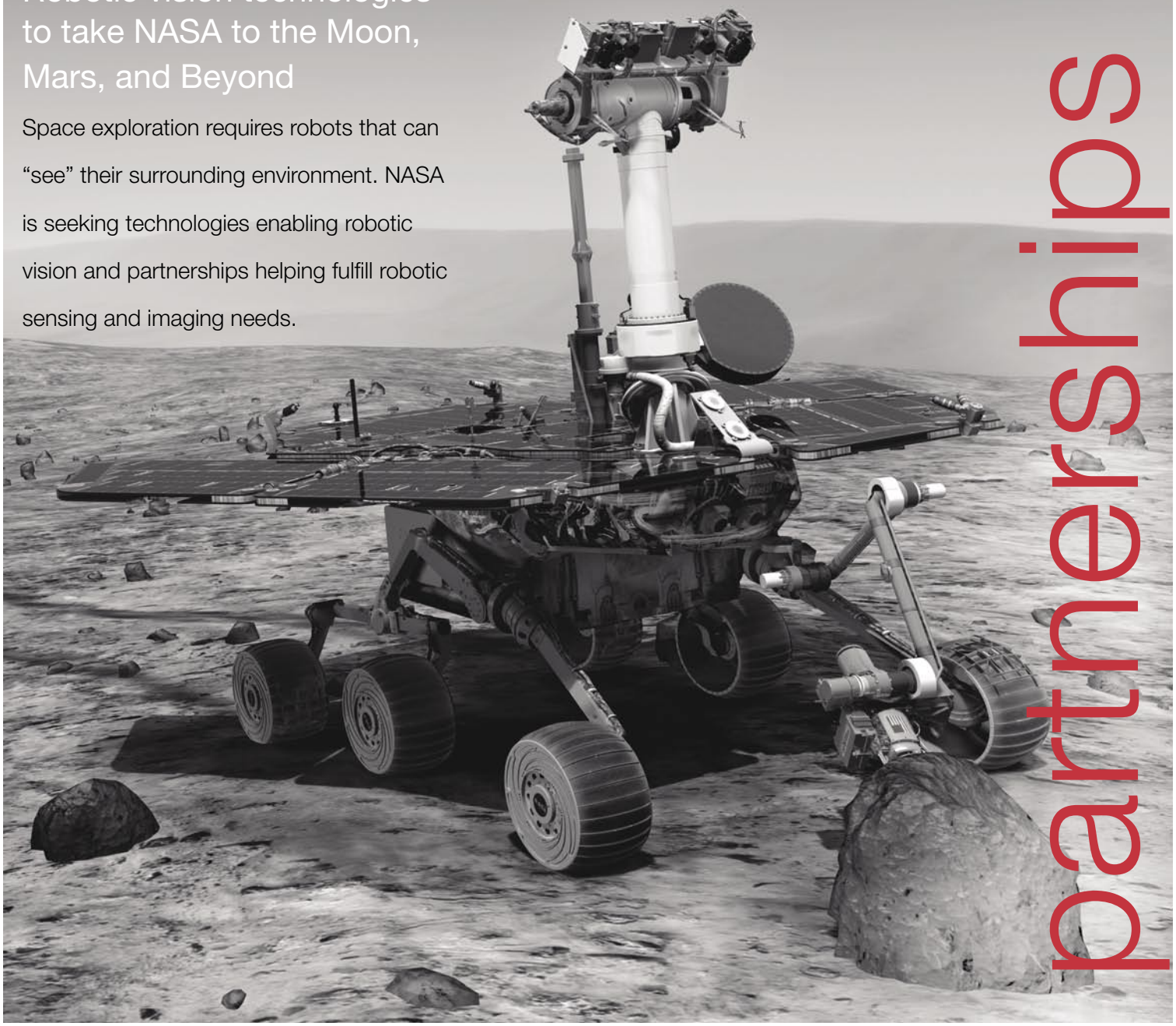
National Aeronautics and Space Administration
Innovative Partnerships Program

Wanted:

Robotic vision technologies to take NASA to the Moon, Mars, and Beyond

Space exploration requires robots that can "see" their surrounding environment. NASA is seeking technologies enabling robotic vision and partnerships helping fulfill robotic sensing and imaging needs.



partnerships

Robotics and space exploration

Robots are an essential part of achieving the new *Vision for Space Exploration*. In order to function, respond, and adapt to changes in the environments on the Moon, Mars, and Beyond, robots will use a combination of optical and non-optical vision as well as decision-making capabilities. Intricate, integrated sensing and imaging technologies will enable rudimentary responses, such as movement and manipulation of robotic arms, as well as complex, multiple-step actions.

examples

Robotics will be used to prepare for and implement **assembly and deployment** tasks:

- **Staging**: Capturing, docking, berthing
- **Storing**: Environmental protection, just-in-time component availability
- **Preparing**: Unpack, inventory, prepare worksite and worksystem
- **Constructing**: Erect, inflate, fabricate
- **Transporting**: Local delivery
- **Positioning/Aligning**: Prepare for joining
- **Joining**: Connections, welding, bonding
- **Verifying**: Inspect, test, as-built documentation
- **Planning, logistics, training**: Time estimating, resource management, decision criteria

Robotics will be used to perform **servicing and maintenance** tasks:

- **Inspection**: Passive, active
- **Diagnostics**: Characterize and project system performance
- **Planned maintenance**: Modular, human-robotic
- **Unplanned maintenance**: Diagnosis and planning, improvisation skills
- **Install upgrade**: Modularity
- **Planning, logistics, training**: Time estimating, resource management, decision criteria

how robotics will be used

assembling

characterizing

constructing

exploring

inspecting

observing

preserving safety

sampling

servicing

verifying

robotic capabilities

adaptation

automation

interaction (with each other and humans)

locomotion

manipulation

navigation

positioning

reconfiguration

electronic component needs

radiation hard

tolerant of extreme temperatures

flexible (for robotic “skin”)

IT needs

algorithms for path planning

multi-sensor data fusion

planning

scheduling

industry sources for technologies and partners

automotive

biomedical

consumer goods

electronics

health care

homeland security/ defense

military

nuclear power

oil and gas industry

satellite communications

smart fabric, interactive textiles

underwater discovery/ exploration

sensing needs for robotics

acoustic conduction

chemical

elemental

field

haptic

orientation

particles

pressure

proximity

sniffers

tactile

visual

Innovative partnerships

NASA’s *Vision for Space Exploration* encompasses a broad range of human and robotic missions to the Moon, Mars, and Beyond. In fulfilling this vision, NASA intends to partner with outside organizations to address the many technical challenges.

Innovation challenges

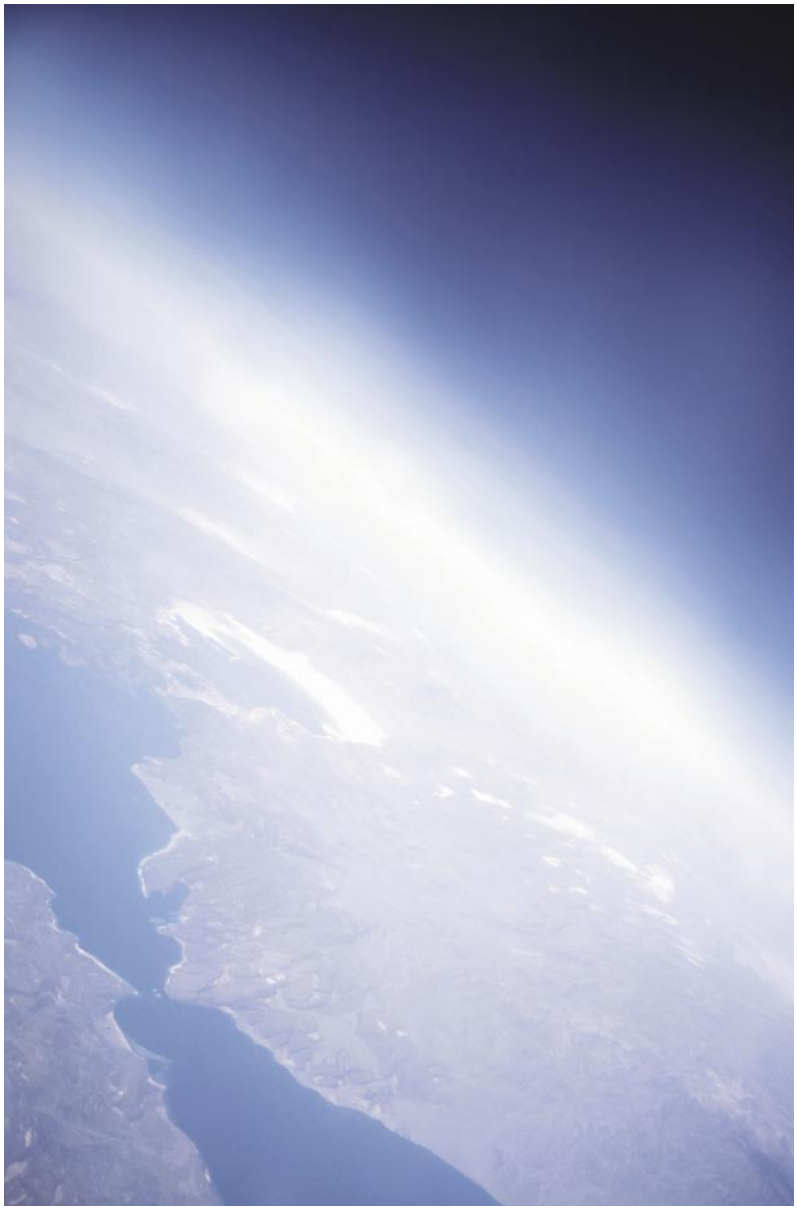
- Advanced materials and structures
- Energy conversion, storage and management
- Autonomy and robotics
- Systems health management

Leveraging other developments

NASA is interested in advancements in industry, universities, and other government agencies. Their significant investment of resources can be leveraged by NASA to advance space exploration.

NASA has innovative technologies, state-of-the-art facilities, and cutting-edge experts. In partnering with NASA, you will have access to these inventions and capabilities to advance your own research and development.

NASA: Explore • Discover • Understand



New to NASA?

NASA is looking for partners in a wide range of industries, including medicine, advanced materials, transportation, telecommunications, manufacturing, consumer products, and other industry sectors. Whether you have partnered with NASA in the past or you're new to working with NASA, contact us to find out how you can contribute to NASA's robotic vision needs.

contact us today:

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